

Overview of West Virginia Watershed Assessment Program

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The Watershed Assessment Program (WAP) of the West Virginia Division of Environmental Protection's (DEP) Office of Water Resources (OWR) determines the quality of the state's water resources by assessing major watersheds in a five-year cycle to coincide with the reissuance of National Pollutant Discharge Elimination System (NPDES) permits. This 5-year cycle has additional advantages. These include:

- C facilitating the addition of stakeholders to the information gathering process,
- C insuring assessment of all watersheds,
- C improving the OWR's ability to plan, and
- C buffering the assessment process against domination by special interests.

WAP assesses the health of a watershed by evaluating the health of as many of its streams as possible, as close to their mouths as feasible. WAP has a three-tier hierarchy of sampling, The General Sampling Strategy, The Random Sampling Strategy, and TMDL Sampling.

The General Sampling Strategy applies to most of the streams WAP samples. It can be broken into several steps:

- ✓ The names of streams are retrieved from the EPA's Water Body System database.
- ✓ A list of streams is developed that includes several sub-lists, including:
 1. Severely impaired streams,
 2. Slightly or Moderately impaired streams,
 3. Unimpaired streams,
 4. Unassessed streams, and
 5. Streams of particular concern to citizens and permit writers.
- ✓ Assessment teams visit as many streams listed as possible and sample as close to the streams' mouths as allowed by road access and sample site suitability. Longer streams may be sampled at additional sites upstream. If inaccessible or unsuitable sites are dropped from the list, they are replaced with alternate sites.

The Random Stream Sampling Strategy follows these steps:

- ✓ About 30-45 stream locations are selected randomly from the EPA database.
- ✓ Personnel from WAP, Environmental Enforcement and other groups reconnoiter the locations to secure landowner approval for sampling and to determine if the site is suitable for sampling.
- ✓ Sampling teams visit the sites and sample in accordance with WAP protocols.

- ✓ Special statistical analyses allow comparisons between watersheds.

TMDL sampling is usually targeted towards a specific parameter. A TMDL consists of a Waste Load Allocation, Load Allocation (a Non Point Source version of a Waste Load Allocation) and a margin of safety. WAP samples lakes, ponds and streams for TMDL purposes. In simple terms a TMDL is a plan of action used to clean up polluted waters. This plan includes:

1. Identifying and prioritizing the pollution source, and
2. Developing a strategy for contaminant source reduction and elimination

A variety of models are employed depending upon the nature of the TMDL. Dynamic models such as HSPF, WARMP, WASP, and others are used to predict impacts from non-point sources such as agriculture and acid mine drainage. Steady state models such as QUAL II are used to predict impacts from point sources such as domestic sewage treatment facilities. Many of these models are contained in the Basins Model Package developed by U. S. EPA.

WAP has chosen a specific combination of physical, chemical and biological variables to help determine stream health and what types of stressors may be operating on the benthic community.

The stream side and instream habitats, and the benthic macro- invertebrates (bottom-dwelling animals that do not have backbones) are the center of the ecological assessment. Habitat evaluations are important to the assessment because they reflect the physical conditions that support the benthic community. The benthic community is crucial because it reflects environmental conditions over an extended period of time. Other parameters, like dissolved oxygen concentration, are important, but may reflect recent fluctuations in environmental conditions. A release of a contaminant that flowed through the reach a week ago, for example, would be reflected by the impaired benthos, but probably would not be revealed in a water sample.

To determine the biological health of a stream, WAP needs a condition to compare it to. Previously, WAP used the least impaired site in a watershed as the reference condition. Some watersheds have an abundance of reference streams such as Shavers Fork of the Cheat where water quality is good and the habitat hasn't been disturbed for many years. Other watersheds, such as the Coal River or Tug Fork of Big Sandy, have few non-impaired streams. WAP now uses a collection of streams that meet a predetermined minimum impairment criterion as the reference condition.

To analyze the benthic data, DEP uses the methods outlined in the Rapid Bioassessment Protocols (RBP's) developed by U.S. EPA. DEP uses a modified version of RBP II. Five characteristics or metrics of the benthic community are used to assess stream quality. The metrics are automatically calculated from data plugged into an EXCEL spreadsheet. Once the metrics have been calculated, a bioscore is assigned based on comparability to the reference condition. The higher the bioscore, the more comparable a stream is to the reference condition.

A sample is collected to analyze for fecal coliform bacteria. Fecal coliform bacteria is an indicator of contamination from material found in sewage, livestock waste and wildlife excrement. A higher

concentration of fecal coliform bacteria indicates a greater likelihood of a public health threat through direct contact with the water.

WAP largely focuses on assessing the health of the smaller streams in West Virginia. A program within WAP, called the Ambient Water Quality Monitoring Network (AWQN), assesses the health of the larger rivers. The chemical parameters used by the AWQN are basically the same as those WAP uses.

AWQN data is used to calculate waste load allocations, determine 303(d) listings, recommend stream management direction and guide further research. For many sites this database stretches back nearly thirty years. This long-term string of data is useful in calculating water quality trends.

Over time WAP will develop a database that will provide a clear picture of the water quality based on the chemistry and the biological life existing in all of West Virginia's waters.

WAP routinely samples for the following parameters: Acidity, Alkalinity, Sulfate, Iron, Aluminum, Manganese, Fecal Coliform Bacteria, Specific Conductance, pH, Temperature, Dissolved Oxygen, Total Phosphorus, Nitrite + Nitrate Nitrogen, Ammonia-Nitrogen, Un-ionized Ammonium-Nitrogen, Suspended Solids, Stream Flow, and Chlorides.

Parameters are selected based on the type of impact suspected. For example, nutrient and bacteria data would be important in agricultural areas while metals, pH, and sulfate data would be beneficial in watersheds impacted by mining. Often times, specific parameters are collected based on TMDL needs while other parameters are collected to determine general water quality conditions.